IN THE SPECIFICATION

Please amend the paragraphs beginning on line 4 of page 1 as follows:

This application claims the benefit, under 35 U.S.C. §119(e), of the following U.S. Provisional Applications:

Serial No. 60/464,185, filed April 21, 2003, entitled "Tile Lighting Methods and Systems;

Serial No. 60/467,913, filed May 5, 2003, entitled "Tile Lighting Methods and Systems;

Serial No. 60/500,754, filed September 5, 2003, entitled "Tile Lighting Methods and Systems;

Serial No. 60/523,903, filed November 20, 2003, entitled "Light System Manager;" and

Serial No. 60/558,400, filed March 31, 2004, entitled "Methods and Systems for Providing Lighting Components."

This application also claims the benefit, under 35 U.S.C. §120, as a continuation-in-part (CIP) of U.S. Non-provisional application Serial No. 10/803,540, filed March 18, 2004, entitled "Geometric Panel Lighting Apparatus and Methods;" ~~which in turn is a continuation of Serial No. 09/213,540, filed December 17, 1998, entitled "Data Delivery Track," now U.S. Patent No. 6,720,745, issued April 13, 2004~~.

Each of the aforementioned applications is incorporated herein by reference.

This application also claims the benefit, under 35 U.S.C. §120, as a continuation-in-part (CIP) of U.S. Non-provisional application Serial No. 10/245,786, filed September 17, 2002, entitled "Light Emitting Diode Based Products," which in turn claims the benefit of the following U.S. Provisional applications:

Serial No. 60/322,765, filed September 17, 2001, entitled "Light Emitting Diode Illumination Systems and Methods;" and

Serial No. 60/329,202, filed October 12, 2001, entitled "Light Emitting Diode Illumination Systems and Methods."

Please replace the paragraph on page 16, beginning on line 19, with the following amended paragraph:

Figs. 6A and 6B depicts wall mounting methods and systems for a tile light embodiment of the invention.

On page 16, before line 21, please insert the following new paragraph:

Figs. 6C and 6D depict ceiling mounting methods and systems for a tile light embodiment of the invention.

Please replace the paragraph on page 16, beginning on line 21, with the following amended paragraph:

Figs. 7A and 7B depicts a wall mounting rail system for a tile lighting system.

Please replace the paragraph on page 16, beginning on line 25, with the following amended paragraph:

Figs. 10A and 10B illustrates a bracket system for connecting tile lighting units.

Please replace the paragraph on page 17, beginning on line 10, with the following amended paragraph:

Figs. 18A and 18B illustrates a tile lighting unit designed to be placed flush to a flat surface.

Please replace the paragraph on page 18, beginning on line 24, with the following amended paragraph:

Figs. 42A and 42B shows ~~a direct~~ views of an LED board with a plurality of lighting elements disposed on it.

Please replace the paragraph on page 18, beginning on line 26, with the following amended paragraph:

Figs. 43A and 43B shows an LED board with a diffuser disposed in proximity to it at an angle relative to the surface of the board.

Please replace the paragraph on page 18, beginning on line 28, with the following amended paragraph:

Figs. 44A-44D shows embodiments of different shapes and types of materials that can be used as diffusers.

Please replace the paragraph on page 19, beginning on line 1, with the following amended paragraph:

Figs. 46A-46D shows a push-through fastening mechanism for a light node.

Please replace the paragraph on page 19, beginning on line 3, with the following amended paragraph:

Figs. 48A and 48B shows a hemispherical diffuser with a graphical element included on it.

Please replace the paragraph on page 19, beginning on line 12, with the following amended paragraph:

Figs. 54A and 54B shows a grid for holding light nodes.

Please replace the paragraph on page 19, beginning on line 28, with the following amended paragraph:

Figs. 67A, 67B, and 67C shows additional configurations for lighting units.

Please replace the paragraph on page 19, beginning on line 30, with the following amended paragraph:

Figs. 69A and 69B shows a light system manager facility.

Please replace the paragraph on page 36, beginning on line 21, with the following amended paragraph:

In the system of Fig. 2, each LUC in turn may be coupled to a central controller 202 that is configured to communicate with one or more LUCs. Although Fig. 2 shows three LUCs coupled to the central controller 202 via a switching or coupling device ~~204~~ 206, it should be appreciated that according to various embodiments, different numbers of LUCs may be coupled to the central controller 202. Additionally, according to various embodiments of the present invention, the LUCs and the central controller may be coupled together in a variety of configurations using a variety of different communication media and protocols to form the networked lighting system 200. Moreover, it should be appreciated that the interconnection of LUCs and the central controller, and the interconnection of lighting units to respective LUCs, may be accomplished in different manners (e.g., using different configurations, communication media, and protocols).

Please replace the paragraph on page 53, beginning on line 1, with the following amended paragraph:

Referring to Fig. 6, there are a variety of mounting provisions for mounting of the tiles 500 or panels to surfaces or for interconnecting elements. In one embodiment, as shown in Figs. 6A and 6B, wall mounting 602 is used. Wall mounting uses mounting clips 604 and bracket 605 to provide desired spacing, to secure units to the wall, and to provide spacing from the wall. Attachment to a wall can be through a bracket such as a Z-bracket or two-piece ~~cleats~~ assemblies such as Z-clips or French- cleats. In one embodiment, as assembled unit 500A of multiple tiles 500 may be pre-assembled on the ground and mounted on a Z-track 605, as shown in Fig. 6B. Tiles 500 can also be hung like a picture from a hook by a wire across the back. These cleat designs also can incorporate features such as channels or recessed surfaces to allow the running of wires for communication of data and positioning of power supplies between adjacent units or to better route such cabling for the purposes of termination and passage through wall cavities and junction boxes. Figs. 6C and 6D and the subsequent figures show more details on how the tiles 500 can be used and mounted.

Please replace the paragraph on page 53, beginning on line 13, with the following amended paragraph:

Figs. 6C and 6D also shows ceiling mounting 608. While the devices can be secured to a ceiling via brackets and other attachments as described in the wall mounting embodiment, ceilings are often covered with a suspended grid infrastructure that allows for a variety of ceiling tiles as well as lights and HVAC-related elements. Ceiling tile elements 610 can be sized to fit into standard suspended ceiling grids. For example a 2-foot by 2-foot element 610 could fit directly into a standard ceiling grid 612. Additional wiring options for ceiling mounting can include jumper cables from unit to unit to give flexibility in installation.

Please replace the paragraph on page 54, beginning on line 21, with the following amended paragraph:

Referring to Fig. 8, another aspect of this invention 800 is that wiring of the devices can be done through a direct connector 802 between tiles 500 similar in principle to building blocks.

That is, the modular tiles 500 or panel elements can be directly connected to each other with both mechanical and electrical attachments 802.

Please replace the paragraph on page 56, beginning on line 1, with the following amended paragraph:

Fig. 12 shows an example of a portion of a circuit implementation of a LUC including a power-sensing module 1114 according to one embodiment of the invention. In Fig. 12, the power supply input connection is shown as a positive terminal 1112A and a ground terminal 1112B. Similarly, the power output connection to the lighting units is shown as a positive terminal 1110A and a ground terminal 1110B. In Fig. 12, the power sensing module 1114 is implemented essentially as a current sensor interposed between the ground terminal 1112B of the power supply input connection and the ground terminal 1110B of the power output connection. The current sensor includes a sampling resistor R3 to develop a sampled voltage based on power drawn from the power output connection. The sampled voltage is then amplified by operational amplifier U6 to provide an output signal 1116 to the processor ~~1102~~ 102 indicating that power is being drawn.

Please replace the paragraph on page 56, beginning on line 14, with the following amended paragraph:

In one aspect of the embodiment shown in Fig. 12, the power input supply connection 1112A and 1112B may provide a supply voltage of approximately 20 volts, and the power sensing module ~~314~~ 1114 may be designed to generate an output signal ~~316~~ 1116 of approximately 2 volts per amp of load current (i.e., a gain of 2 V/A) drawn by the group of lighting units coupled to the LUC. In other aspects, the processor ~~1102~~ 102 may include an A/D converter having a detection resolution on the order of approximately 0.02 volts, and the lighting units may be designed such that each lighting unit may draw approximately 0.1 amps of current when energized, resulting in a minimum of approximately a 0.2 volt output signal 1116 (based on the 2 V/A gain discussed above) when any unit of the group is energized (i.e., easily resolved

by the processor's A/D converter). In another aspect, the minimum quiescent current (off-state current, no light sources energized) drawn by the group of lighting units may be measured from time to time, and an appropriate threshold may be set for the power sensing module 1114, so that the output signal 1116 accurately reflects when power is being drawn by the group of lighting units due to actually energizing one or more light sources.

Please replace the paragraph on page 57, beginning on line 1, with the following amended paragraph:

As discussed above, according to one embodiment of the invention, the LUC processor ~~1102~~ 102 may monitor the output signal 1116 from the power sensing module 1114 to determine if any power is being drawn by the group of lighting units, and use this indication in an identifier determination/learning algorithm to determine the collection of identifiers of the group of lighting units coupled to the LUC.

Please replace the paragraph on page 58, beginning on line 7, with the following amended paragraph:

To reduce the number of light emitting elements required for a tile 500, boards with LEDs can be mounted as a lighting unit 100 or light source 1502 on the edges facing in towards the center of the shape as shown in the right hand side of Fig. 15. Light radiating away from the light source 1502 will fade in intensity as a function of distance away from the light source 1502. In order to provide more uniform illumination, the shape of the interior of the tile 500 can be configured in such a way as to capture and reflect the illumination to provide a more uniformly illuminated surface for a cover 1512 that is placed over the region in which the light sources 1502 are placed. In Fig.15, a pyramid 1510 is shown in relief, coming towards the viewer and providing an increase in light towards the viewer. The faces of the pyramid 1504 near the base of the pyramid 1510 are brighter than the flat area 1508 that is nearer to the light source 1502, because the angle of incidence of light from the light source 1502 is such that more light is

reflected upward (toward the eye of a viewer who is looking on the tile 500 from a direction substantially toward the top of the pyramid 1508) from the angled faces 1504 than from the flat areas 1508. With the diffusing cover 1512, this effect provides nearly uniform intensity of illumination from the whole tile 500, as shown in the left hand side of Fig. 15. Thus, Fig. 15 shows a tile 500 with an edge lit interior, ~~both~~ with, and without, the diffusing cover 1512. Note the use of the pyramidal element ~~1508~~ 1510 to guide, diffuse and homogenize light output. Diagonals provide separation between adjacent areas and can be provided at a variety of heights to eliminate or allow overlap of colors from adjacent sections.

Please replace the paragraph on page 58, beginning on line 29, with the following amended paragraph:

While the pyramid ~~1508~~ 1510 is a simple shape to implement a favorable light effect, other shapes may be provided and may be more effective over different differences and different configurations of tiles 500. Curved shapes, specifically those tailored to the mathematical model of light distribution, can provide even better uniformity over the distance. A shape described by a 2nd order equation, such as a parabola, may be better suited to giving the correct properties of uniformity of reflected light toward the eye of a viewer of the tile 500.

Please replace the paragraph on page 59, beginning on line 23, with the following amended paragraph:

Note that the use of a surface in the interior of the tile 500, such as the pyramid ~~1508~~ 1510, can create a void beneath which space can be used to hide power supplies and controllers, connectors and other related pieces of the system of tiles 500.

Please replace the paragraph on page 60, beginning on line 17, with the following amended paragraph:

Figs. 16 and 17 show a variety of textures and shapes that can be used to diffuse and diffract light among the wide variety that are encompassed by this disclosure. The covers 1600A-1600C can incorporate graphics and other elements such as characters and artwork. Tessellations can be provided in Escher-like or Penrose-type patterns that are either periodic or aperiodic. ~~The tiles~~ Tiles ~~500~~ incorporating covers in these many textures and shapes can be disposed in many environments, such as to cover parts of building interiors and exteriors, including walls, doors, windows, ceilings, floors, furniture, tables, shelves, and other surfaces.

Please replace the paragraph on page 61, beginning on line 1, with the following amended paragraph:

Fig. 20 shows a configuration 2000 with regular grids of color changing elements 2002, each using an LED package that incorporates a red, a green and a blue LED. Of course other LED colors can be used. The light emitting elements are coupled with an integrated control, power and communications chip or ASIC on the back of the board, which makes the development of arbitrarily shaped configurations a very straightforward process. Figs. 20 and 21 show two different printed circuit boards 2000, 2100, with different spacing between the lighting elements 2002, 2102. Configuration 2000 is a 6 by 6 array, or 36 units per square foot. Configuration 2100 is an 8 by 8 array, or 64 elements 2102 per square foot. This number can be varying in accordance with particular applications, and there are no limits until the entire space is completely filled with light-emitting elements 2002, 2102. These controlled light boards can be made in any shape. Each node can be made individually controllable, whether by an addressing scheme such as DMX, or more preferably in some embodiments, a string light protocol described elsewhere herein, in which each node receives data in a series and responds to the first unmodified data element in the stream. In this particular embodiment, and RGB cluster is co-located in a single package. When the lighting elements are placed in such a grid configuration, a diffusing panel can be placed directly over the elements, and any shape, symbol, character or the like can be created by authoring signals to each grid element, varying the intensity and color of the grid element. One embodiment is a plurality of boards 204 arranged in a square pattern and covered by a diffuser to form a tile light 500. In embodiments, the control can be object-

oriented control, such as in conjunction with a software authoring system as described elsewhere herein. In embodiments the authoring can be a geometric authoring method, such as described elsewhere herein. Thus, effects authored in software, such as Flash animations, can be replicated in the configurations 2000, 2100, then diffused in a diffusing panel, resulting in very pleasing effects, such as explosions of color, chasing rainbows, tie-dye-like effects, and the like. Effects can include scrolling text, graphics, animations, and the like. In embodiments effects can be authored to respond to an input signal ~~124~~ 122, such as an incoming video signal, where the individual lighting units 100 that form a grid or array respond to elements of the video signal, such as to represent pixels, or portions of pixels, of the incoming video signal.

Please replace the paragraph on page 62, beginning on line 4, with the following amended paragraph:

Referring to Fig. 22, another embodiment 2200 uses different physical layers for an effect. The method uses integral LED nodes 2204 with diffusers 2202. Using polygonal PCBs with white solder mask; each node ~~2202~~ 2204 sits under a bump on the diffuser material ~~2204~~ 2202. The effect is a number of separately addressable controllable nodes floating in a uniform color field. Light emitting nodes 2204, shown as small circles, emit light upwards into the diffusers 2202, which can have a variety of shapes and textures. This can be in addition to edge lighting units whose light is shown by the horizontal arrows in Fig. 22.

Please replace the paragraph on page 63, beginning on line 27, with the following amended paragraph:

An embodiment of the present invention describes a method 2400 for generating control signals as illustrated in the block diagram in Fig. 24. The method may involve providing or generating an image or representation of an image, i.e., a graphical representation 2402. The graphical representation may be a static image such as a drawing, photograph, generated image, or image that is or appears to be static. The static image may include images displayed on a

computer screen or other screen even though the image is continually being refreshed on the screen. The static image may also be a hard copy of an image.

Please replace the paragraph on page 66, beginning on line 16, with the following amended paragraph:

Referring still to Fig. 24, the graphical representation 2402 and the configuration information from the light system configuration facility 2404 can be delivered to a conversion module 2408, which associates position information from the configuration facility with information from the graphical representation and converts the information into a control signal 2410, such as a control signal for a lighting unit 100. Then the conversion module can communicate the control signal, such as to the lighting unit 100. In embodiments the conversion module maps positions in the graphical representation to positions of lighting units 100 in the environment, as stored in a configuration file for the environment (as described below). The mapping might be a one-to-one mapping of pixels or groups of pixels in the graphical representation to lighting units 100 or groups of lighting units 100 in the environment 100. It could be a mapping of pixels in the graphical representation to surfaces 107, polygons, or objects in the environment that are lit by lighting units 100. A mapping relation could also map vector coordinate information, a wave function, or an algorithm to positions of lighting units 100. Many different mapping relations can be envisioned and are encompassed herein.

Please replace the paragraph on page 67, beginning on line 1, with the following amended paragraph:

Referring to Fig. 25, another embodiment of a block diagram for a method and system for generating a control signal 2500 is depicted. A light management facility 2502 is used to generate a map file 2504 that maps lighting units 100 to positions in an environment, to surfaces that are lit by the light systems, and the like. An animation facility 2508 generates a sequence of graphics files 2510 for an animation effect. A conversion module 2512 relates the information in the map file 2504 for the lighting units 100 to the graphical information in the graphics files. For

example, color information in the graphics file may be used to convert to a color control signal for a lighting unit 100 to generate a similar color. Pixel information for the graphics file may be converted to address information for lighting units 100, which will correspond to the pixels in question. In embodiments, the conversion module 2512 includes a lookup table for converting particular graphics file information into particular lighting control signals, based on the content of a configuration file for the lighting system and conversion algorithms appropriate for the animation facility in question. The converted information can be sent to a playback tool 2514, which may in turn play the animation and deliver control signals 2518 to lighting units 100 in an environment.

Please replace the paragraph on page 67, beginning on line 18, with the following amended paragraph:

Referring to Fig. 26, an embodiment of a configuration file 2600 is depicted, showing certain elements of configuration information that can be stored for a lighting unit 100 or other system. Thus, the configuration file 2600 can store an identifier 2602 for each lighting unit 100, as well as the position 2608 of that light system in a desired coordinate or mapping system for the environment 100 (which may be (x,y,z) coordinates, polar coordinates, (x,y) coordinates, or the like). The position ~~508~~ 2608 and other information may be time-dependent, so the configuration file 2600 can include an element of time 2604. The configuration file 2600 can also store information about the position 2610 that is lit by the lighting unit 100. That information can consist of a set of coordinates, or it may be an identified surface, polygon, object, or other item in the environment. The configuration file 2600 can also store information about the available degrees of freedom for use of the lighting unit 100, such as available colors in a color range 2612, available intensities in an intensity range 2614, or the like. The configuration file 2600 can also include information about other systems in the environment that are controlled by the control systems 2618 disclosed herein, information about the characteristics of surfaces 107 in the environment, and the like. Thus, the configuration file 2600 can map a set of lighting units 100 to the conditions that they are capable of generating in an environment 100.

Please replace the paragraph on page 88, beginning on line 30, with the following amended paragraph:

Referring to Fig. 42, the light sources 4102 are now viewed directly, without intervening diffusing materials. Figure 42 is a direct view image of the LEDs 4102 mounted in a regular array on a board ~~4202~~ 4102. No diffuser is used. As can be seen in this image, the light sources 4202 appear as bright points of light. Each can be individually controlled or they can be synchronized to do the same thing over time. On top of Fig. 42 are shown a row of LEDs that are facing outwards; no materials interrupt the light path to the view. In the bottom image, the boards show four 1' square boards each within 8x8 (64) grid of RGB LED light sources.

Please replace the paragraph on page 90, beginning on line 9, with the following amended paragraph:

Referring to Fig. 45, there are many embodiments of fastening and mounting facilities for light sources of the present invention to hold LED modules to a surface. The embodiments of Fig. 45 are meant to be illustrative of general fastening facilities, and not limiting. This example set in no way limits the means by which one material or surface may be attached to another. IN the embodiment 4502, small features on the side lock into a circular hole in a panel as it pressed into the hole from the top of the panel. The cable connecting the modules is shown in cross-section and passes from one module to the next in a continuous fashion and is tied into the module via insulation displacement means (IDC-style). The module ~~4505~~ 4504 has a small flat tab 4506 to the side that is integral to the package and is used as a hold down area via a screw, nail, staple or other fastener. In the embodiment 4508, a small separate flat piece with a mating feature is fastened to a surface and the module is snapped atop the separate piece. In the embodiment 4510, the embodiment is similar to the embodiment 4504, but the area of the tab is either circular or extends through the bottom of the module. In the embodiment 4512, a smaller hole is created in the panel and the screw feature shown in 4516 can be threaded or used with a self-tapping screw from the other side of the mounting surface. In the embodiment 4524, a panel fastener 4526 is attached or integrated into the module design and is pushed through an

appropriately sized hole and thus held directly in place. In the embodiment 4518, a two piece arrangement is provided in which the first bottom piece 4528 is attached to a mounting surface via one of many possible means including but not limited to screws, nails, adhesives etc. The second piece 4530 with the cabling preattached, is snapped into the bottom piece via mating features that provide a locking action when the module is pressed in from above. Additional features, not shown, fore and aft prevent the unit from sliding or moving in the bottom mounting piece 4528. In the embodiment 4514, a tab extending from the bottom piece 4528 can then be attached to the surface. The module attaches to the bottom piece 4528 in a similar manner as described in connection with the embodiment 4518. In the embodiment 4520, the module pokes through from the bottom of the panel. Similar features provide a snap-in capability and the cabling remains on the bottom of the panel. In the embodiment 4522, adhesive, in the form of a double-sided piece, can be attached to the bottom of the module and to the module itself. For installation, protective material is peeled away from the adhesive revealing the sticky surface and then pressed onto the mounting surface. In the event of direct or other materials, the adhesive can be scraped or removed and a new piece of DST applied.

Please replace the paragraph on page 99, beginning on line 23, with the following amended paragraph:

Referring to Fig. 69a, it is desirable to provide a light system manager 5000 to manage control of a plurality of lighting units 100 or light systems. Referring to Fig. 69b, the light system manager 5000 is provided, which may consist of a combination of hardware and software components. Included is a mapping facility 5002 for mapping the locations of a plurality of light systems. The mapping facility may use various techniques for discovering and mapping the locations of lights, such as described herein or as known to those of skill in the art. Locations may be physical locations in the world or may be relative locations, such as the relative position of a lighting unit 100 in a string or array of lighting units 100. Also provided is a light system composer 5004 for composing one or more lighting shows that can be displayed on a light system. The authoring of the shows may be based on geometry and an object-oriented programming approach, such as the geometry of the light systems that are discovered and

mapped using the mapping facility, according to various methods and systems disclosed herein and in the documents incorporated herein by reference or known in the art. Also provided is a light system engine 5008, for playing lighting shows by executing code for lighting shows and delivering lighting control signals, such as to one or more lighting systems, or to related systems, such as power/data systems, that govern lighting systems. Further details of the light system manager 5000, mapping facility 5002, light system composer 5004 and light system engine 5008 are provided herein.

Please replace the paragraph on page 101, beginning on line 8, with the following amended paragraph:

Referring still to Fig. 70, in an architecture for delivering control systems for complex shows to one or more light systems, shows that are composed using the authoring computer 5010 are delivered via an Ethernet connection through one or more Ethernet switches to the light system engine 5008. The light system engine 5008 downloads the shows composed by the light system composer 5004 and plays them, generating lighting control signals for light systems. In embodiments, the lighting control signals are relayed by an Ethernet switch to one or more power/data supplies and are in turn relayed to light systems that are equipped to execute the instructions, such as by turning LEDs on or off, controlling their color or color temperature, changing their hue, intensity, or saturation, or the like. In embodiments the power/data supply may be programmed to receive lighting shows directly from the light system composer 5004. In embodiments a bridge 1752 may be programmed to convert signals from the format of the light system engine 5008 to a conventional format, such as DMX or DALI signals used for entertainment lighting.

Please replace the paragraph on page 102, beginning on line 4, with the following amended paragraph:

Referring to Fig. 71, in embodiments the lighting shows composed using the light system composer 5004 are compiled into simple scripts that are embodied as XML documents. The

XML documents can be transmitted rapidly over Ethernet connections. In embodiments, the XML documents are read by an XML parser 1802 of the light system engine 5008. Using XML documents to transmit lighting shows allows the combination of lighting shows with other types of programming instructions. For example, an XML document type definition may include not only XML instructions for a lighting show to be executed through the light system engine 5008, but also XML with instructions for another computer system 1850, such as a sound system, and entertainment system, a multimedia system, a video system, an audio system, a sound-effect system, a smoke effect system, a vapor effect system, a dry-ice effect system, another lighting system, a security system, an information system, a sensor-feedback system, a sensor system, a browser, a network, a server, a wireless computer system, a building information technology system, or a communication system.

Please replace the paragraph on page 102, beginning on line 19, with the following amended paragraph:

Thus, methods and systems provided herein include providing a light system engine for relaying control signals to a plurality of light systems, wherein the light system engine plays back shows. The light system engine 5008 may include a processor, a data facility, an operating system and a communication facility. The light system engine 5008 may be configured to communicate with a DALI or DMX lighting control facility. In embodiments, the light system engine communicates with a lighting control facility that operates with a serial communication protocol. In embodiments the lighting control facility is a power/data supply for a lighting unit ~~102~~ 100.